

and simplicity, *e.g.*, the dorsal rami are laterad and the terminal filaments are dorsad of the line of origin, which relation is not shown.

Acc. Accessions from the N. accessorius to the N. vagus, etc. Acromio-trapezius, the three rami to the M. acromio-trapezius.

Clavo-mastoideus, ca., the caudal ramus of the clavo-mastoid nerve. Clv.-mas. ce., the cephalic ramus of the same. Clavo-trapezius, the two principal rami to the M. clavo-trapezius. Crv., cervical myelic nerve. Hi., the hiatus trapezii. Inf., the ganglion inferius. or ganglion of the trunk of the N. vagus. Jug., the G. jugulare of the same nerve. Plexus, the gangliform plexus of the Glosso-pharyngeus, the Vagus, the Accessorius, the Hypoglossus, and the Sympathic nerves. Pl. Crv., the cervical plexus from which the accession is given to the N. accessorius near the hiatus. Spino-trapezius, the rami given to the M. spino-trapezius. Spl., the branch to the M. splenius. Ster.-mas., ramus to the cephalic extremity of the M. sterno-mastoideus. Ster.-mas. ce., ramus to the same. Ster.-mas., dors., ramus to the dorsal border. Ster.-mas., ven., ramus to the ventral border of the same muscle.

BIBLIOGRAPHY.

For bibliography consult the Trigemini Nerve in the Domestic Cat. T. B. Stowell. Proceedings of the American Philosophical Society, Vol. xxiii, pp. 459-478, 1886. Also, The Facial Nerve in the Domestic Cat. T. B. Stowell. Proceedings of the American Philosophical Society, Nov. 5, 1886.

The Hypoglossal Nerve in the Domestic Cat. By T. B. Stowell, A.M., Ph.D.

(Read before the American Philosophical Society, March 2, 1888.)

The reasons for presenting this contribution to comparative neurology have been given elsewhere. (The Facial Nerve in the Domestic Cat. Proceedings of the American Philosophical Society, Nov., 1886.) The preparation of specimens and the magnifying powers used are described in the same paper.

NERVUS HYPOGLOSSUS.

Synonymy.—N. hypoglossus; N. lingualis medius; Par nonum; N. loquens; Hypoglossal nerve; Gustatory nerve; Ninth pair of nerves.

General Characters.—The N. hypoglossus is the motor nerve of the tongue and of muscles that move the hyoid bone. By virtue of its relation to the tongue it is directly concerned in mastication, since by the movements of the tongue successive morsels of food are thrust between the teeth or are moved preliminary to deglutition. Its function is further shown by those mammals whose food is largely liquid and is secured

by lapping, in which animals the prehension of food is impossible after section of the N. hypoglossus. Longet's experiments upon the entocranial trunk after section demonstrated the presence of excitability without sensibility; Mayo and Magendie proved the presence of sensibility in the ectocranial nerve. We are forced to accept a mixed function in this nerve or to attribute its sensibility to the accessions from the myelic nerves.

The section of the N. hypoglossus destroys movements of the tongue without disturbing the tactile or the gustatory sensibility [Longet, *Anatomie et Physiologie du Système Nerveux*, t. ii, p. 266].

The sensibility of the hypoglossus seems to be muscular rather than mucosal. Since the section of the N. vagus and the N. glosso-pharyngeus is attended by loss of sensibility over the entire surface or dorsum of the tongue, although the N. hypoglossus is intact. Panizza's experiments, confirmed by later observations, establish the paralysis of the pharyngeal muscles involved in deglutition by severing the N. hypoglossus. The vaso-motor function of the N. hypoglossus is seen in the dilatation of the vessels of the tongue when the nerve is severed; it is questionable whether the fibres to which this function is referable are not received from the myelic or the sympathetic nerves.

The connection of the N. hypoglossus with distinct articulation is demonstrated by experiment and confirmed by pathological evidence. The prominent role in pronunciation performed by the tongue evinces the importance of this nerve in expressing thought by articulate language.

DESCRIPTION.

Ectal Origin and Entocranial Relations.—The N. hypoglossus has its ectal origin by several (12–16) funiculi along a depression line about 4 mm. laterad of the ventri-meson, and which marks the dorsal border of the caudal half of the area elliptica; these funiculi are grouped into two more or less distinct bundles which are separated by the first dorsal ramulus of the A. cerebellosa caudalis. The cephalic bundle embraces 8–12 funiculi (when the arteriole is represented by two vessels this cephalic bundle is again divided into two nearly equal portions); the caudal bundle includes about 6 funiculi, the caudal funiculus having its ectal origin at the cephalic border of the ventral root of the first cervical nerve, just entad of the A. cerebellosa.

The ectal origin resembles the ventral root of a myelic nerve.

Foramen of Exit.—The confluence of these funiculi forms a nerve trunk, which takes its exit by the foramen condylare.

Ectocranial Trunk.—The ectocranial course is immediately caudad, lies dorsad of the A. carotidea and entad of the V. jugularis as far as the A. occipitalis. The central 5–8 mm. of the ectocranial trunk are intimately involved in the gangliform plexus (Fig. Pl. gang.) which is made by the interlacing fibres of the associated glosso-pharyngeus, vagus, acces-

sorius, hypoglossus and sympathetic nerves. Peripherad of the plexus the N. hypoglossus bends abruptly around the caudal border of the A. occipitalis (Fig. Ang.) and crosses the ectal surface of the N. vagus just cephalad of the G. inferius (vagus), also crosses the ectal surface of the A. carotidea and lies upon the ectal surface of the A. lingualis, which it crosses twice (the artery being the more sinuous), first about 8 mm. peripherad of the origin of the artery (A. lingualis), and again 10-12 mm. still peripherad. This portion of the trunk lies entad of the M. stylohyoideus, along the caudal border of the M. digastricus.

Communicating Rami of the Trunk.—At the angle (Fig. Ang.) a considerable accession is received from the first cervical nerve (myelic, Fig. Anas.); it is possible that this accession is the true origin of the cervico-hypoglossal nerve. (The minute anatomy of this region has not been satisfactorily determined.) Just cephalad of the G. inferius, and peripherad of the plexus a large ramus (Fig. Inf.) joins the ganglion at its dorso-cephalic border.

PRINCIPAL RAMI.

N. cervico-hypoglossus; N. cervicalis descendens; N. descendens noni.—At the angle (Fig. Ang.) where the accession is received from the myelic nerves, as the hypoglossus curves around the A. occipitalis, the N. cervico-hypoglossus takes its ectal origin. An anastomotic nerve joins the myelic nerve and this trunk (Fig. Anas.). The existence of this anastomosis makes it debatable whether the cervico-hypoglossus should be considered a ramus of the N. hypoglossus having a myelic accession, or a myelic nerve having a large accession from the N. hypoglossus. I have adopted the compound name applicable to either of the views cited.

The course of the nerve is ventro-caudad, and is at first entad of the jugular vein; it reaches the carotid artery about 7 mm. caudad of the A. occipitalis and continues caudad upon the ectal surface of the artery about 12 mm. to the origin of the A. thyroidea.

N. omo-hyoideus.—At the origin of the A. thyroidea, a large ramus is given off ventrad (Fig. Om-Hy. ce.). This ramus lies ectad of the artery and innerves the cephalic 25 mm. of the M. omo-hyoideus. The caudal portion of the muscle is innerved by a ramus of the N. cervico-hypoglossus which takes its ectal origin at the point where the nerve trunk touches the dorsal border of the M. sterno-thyroideus. This slender caudal ramus crosses the ectal surface of the sterno-thyroid muscle, enters its dorsal border and may be traced within the muscle to the præsternum* (Fig. Om-Hy. ca.).

N. sterno-thyroideus.—Caudad of the A. thyroidea the cervico-hypoglossus lies in the ental cervical fascia, ectad and ventrad of the A. carotidea.

* The origin of the M. omo-hyoideus is costal instead of scapular, as is the case in man; the general relations are such that little doubt can exist as to the homology of the muscle.

At a point opposite the cephalic extremity of the thyroid body, the nerve-trunk sends a slender ramus, the *cephalic* sterno-thyroid (Fig. St.-Thy. ce), to the cephalic third of the M. sterno-thyroideus: the *caudal* ramus (Fig. St.-Thy. ca.) is the caudal 50-60 mm. of the N. cervico-hypoglossus, and may be said to have its ectal origin at the origin of the ramus to the caudal portion of the M. omo-hyoideus or at the point where the nerve trunk lies upon the dorsal border of the sterno-thyroid muscle; it follows the border of the muscle for about 20-30 mm., when it penetrates the muscle and terminates within the caudal extremities (origins) of the muscles (sterno-hyoid, omo-hyoid, sterno-thyroid), which have a common origin from the lateral border of the præsternum and the first costal cartilage.

Opposite the caudal extremity of the thyroid body the cervico-hypoglossal nerve is joined by a communicating ramus (Fig. communicans) from the adjacent cervical plexus or loop. This is the N. communicans noni. This branch does not seem to be constant.

N. thyro-hyoideus.—The ectal origin of this ramus is entad of the V. jugularis, immediately peripherad of the origin of the cervico-hypoglossal nerve; its course is parallel to the latter nerve and ventrad of it; it crosses the ectal surface of the A. carotidea at the origin of the A. laryngea cephalica, whence it bends ventrad and lies caudad of the artery and cephalad of the N. laryngeus internus; it innerves the M. thyro-hyoideus (Fig. Thy.-Hy.) and sends two terminal ramuli to the M. sterno-hyoideus, a *cephalic* ramulus to the cephalic portion, a *caudal* one to the caudal portion of the muscle. This nerve joins its platetrope in the ventri-meson.

N. stylo-glossus.—About 15 mm. ventrad of the A. carotidea the A. lingualis gives an arteriole to the M. stylo-glossus; centrad of this arteriole the hypoglossus nerve sends a branch, the N. stylo-glossus, to the muscle having the same name. The nerve lies upon the ectal surface of the M. hyo-glossus; at the ventral border of the stylo-glossus muscle it separates into a leash of terminal ramuli which intercommunicate by anastomotic filaments upon the muscle (Fig. Sty.-Gloss.).

N. hyo-glossus.—5 mm. peripherad of the last nerve the hyo-glossal nerve (sometimes 3-4 ramuli from a common trunk, or more frequently separate nerves) is given to the fibres of the M. hyo-glossus. The nerve crosses the ectal surface of the A. lingualis. The terminal filaments intercommunicate and form a loose plexus (Fig. hyoglossus) with the N. lingualis (R. of N. trigeminus), which in this region lies upon the ectal surface of the ranine artery.

N. genio-hyoideus.—At the dorsal border of the M. genio-hyoideus, the N. hypoglossus curves cephalad and follows the general direction of the genio-hyoid muscle, to which it gives from its ventral border the N. genio-hyoideus, which nerve may be traced 20 mm. cephalad in the muscle (Fig. Gen.-Hyoid).

N. genio-hyo-glossus.—Peripherad of the border of the M. genio-hyoideus, the N. hypoglossus bends mesad around the A. lingualis and lies entad of the artery. As it curves around the artery it gives from its ven-

tral border several filaments to the M. genio-hyo-glossus (Fig. Ge-hy-gl.); these filaments by their interlacing form a terminal plexus.

N. lingualis.—The hypoglossal nerve follows the artery along its ental border and supplies terminal filaments to distal 30 mm. of the tongue (Fig. Ter.).

SUMMARY.

A. ANATOMICAL.

Ectal Origin.—The nerve arises by 12–16 funiculi along a line 4 mm. laterad of the ventri-meson, which line marks the dorsal border of the caudal half of the area elliptica. The origin is nearly surrounded by arterioles from the A. cerebellosa.

Foramen of Exit.—Foramen condylare.

Principal Rami, their Origins and Distributions.

1. *N. cervico-hypo-glossus* (descendens noni); origin at the angle as the nerve bends around the A. occipitalis, distribution to the M. omo-hyoideus and to the M. sterno-thyroideus.

2. *N. thyro-hyoideus*; origin immediately peripherad of the last nerve, distribution to the M. thyro-hyoideus and to the M. sterno-hyoideus.

3. *N. stylo-glossus*; arises at a point 15 mm. ventrad of the A. carotidea, distribution to the M. stylo-glossus.

4. *N. hyo-glossus*; origin (2–3 rami) 5–10 mm. peripherad of the last nerve, distribution to the M. hyo-glossus; joins the N. lingualis in a plexus.

5. *N. genio-hyoideus*; origin at the dorsal border of the M. genio-hyoideus, to which muscle it is distributed.

6. *N. genio-hyo-glossus*; origin as the nerve trunk bends around the lingual artery.

7. *N. lingualis*; terminal filaments to the distal 30 mm. of the tongue.

Communicating Rami.

1. To the cervical sympathetic ganglion.

2. To the N. vagus in the plexus gangliformis and in the G. inferius.

3. A large accession at the *angle* from the first myelic nerve.

4. The communicans noni to the N. cervico-hypoglossus.

5. With the N. lingualis (R. of N. trigeminus) in the terminal plexus.

B. PHYSIOLOGICAL.

The N. hypoglossus is the motor nerve of the tongue; it innerves several muscles which move the os hyoides; it is directly related to mastication and to deglutition; it is essential to distinct articulation; in function it is possibly a mixed nerve, the sensibility however is referred by some physiologists to the accessions from the myelic nerves; it possesses vaso-motor fibres, which are possibly derived from the communicating rami.

EXPLANATION OF DIAGRAM.

Anas., anastomotic ramus from first myelic nerve ; this is the disputed origin of the N. cervico-hypoglossus. Ang., the angle where the N. hypoglossus bends around the A. occipitalis. Ca., caudal ramus. Ce., cephalic ramus. Communicans, a myelic accession, the communicans noni. Crv., myelic nerves. Gen-Hyoid, the genio-hyoid muscle. Ge-Hy-Gl., the genio-hyo-glossal muscle. Hyoglossus, the hyo-glossal muscle. Inf., the ramus to the G. inferius of the N. vagus. Lingualis, the lingual nerve of the mandibular division of the N. trigeminus. Om-Hy., the M. omo-hyoideus. Pl. car., anastomotic filament to the carotid plexus. Pl. gang., the plexus gangliformis. Sty-Gloss., the stylo-glossus muscle. St-Thy., the M. sterno-thyroideus. Thy-Hy., the M. thyro-hyoideus.

Aboriginal Pottery of the Middle Atlantic States.

By Francis Jordan, Jr.

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In the whole range of archæology there are few subjects deserving of more thoughtful consideration, or that possess so many instructive and entertaining features as the study of ceramic art as practiced by primitive man. Its development is contemporary with the progress of civilization, and dates from the earliest period of antiquity, beginning with the manufacture of earthenware of the rudest description, exclusively for culinary purposes, from materials that were too obvious even for the semi-barbarian to overlook. The brief paper I have the pleasure of offering for your consideration is restricted to a discussion of but one of the many branches of this interesting study, namely, the characteristic features of the prehistoric pottery of the Middle Atlantic States, of North America, and the conditions under which it has been recovered.

In its fabrication as in all the departments of aboriginal domestic labor, the work was performed by women, who gave to these rude vessels whatever claim to artistic merit they possess, of which the relics of the mound-builders of the Mississippi valley furnish the best examples.

In form, in decoration, and in the use of pigments, and in their construction, these specimens rank with the early productions of the potters of the old world, a superiority that was doubtless the result of contact with the advanced civilization of the Pacific Coast, and a reproduction of its ceramic forms. The pottery of the Atlantic seaboard is more primitive in its character, and denotes, both in design and decoration, a more remote antiquity, a claim, however, that cannot be established if we accept Indian tradition as authority for the belief that the influx of emigration was from